

Dr. Jim Hood, Assistant Professor in the Department of Evolution, Ecology and Organismal Biology at Ohio State University, completed an Ohio Water Resources Center 104(b) funded project titled “**What role does nutrient cycling by zooplankton play in supporting HAB production in western Lake Erie?**” The project aimed to determine the relative importance of zooplankton-mediated nitrogen (N) and phosphorus (P) recycling on harmful algal bloom (HAB) development, timing, and magnitude in the western basin of Lake Erie, identify the physicochemical and biological controls of zooplankton nutrient recycling rates and ratios, and understand zooplankton feeding on HABs and other phytoplankton groups.



Figure 1. Lyndsie Collis, graduate student, taking samples of zooplankton in western Lake Erie

HABs have increased in severity in western Lake Erie, resulting in serious public health and economic consequences. Although spring P-loading from the Maumee River strongly predicts the summer algal bloom extent, it is not clear how the P is stored and cycled prior to and during bloom formation. Dr. Hood’s team completed measurements of zooplankton nutrient recycling (ZNR) and grazing on nine sampling events by quantifying N and P excretion rates by micro- and mesozooplankton regularly at one site in western Lake Erie near the Maumee River mouth. Since planned sampling during the 2020 field season was postponed due to COVID-19, measurements were conducted during the 2021 field season.

Preliminary results indicated the team obtained measurable individual zooplankton P excretion estimates on four of nine dates for total zooplankton excretion and on two of five dates for microzooplankton excretion. Not all microzooplankton excretion soluble reactive phosphorus (SRP) samples have been analyzed. Estimates of community microzooplankton and total zooplankton excretion rates require density estimates of both zooplankton groups and thus will not be available until those samples are enumerated; therefore, the team cannot presently evaluate the relative importance of ZNR. The team will not be able to address ZNR rates and ratios until they finish analyzing the microzooplankton community samples, but they anticipate completing this analysis by the end of 2023. As for zooplankton grazing rates and patterns, preliminary results indicated that during cyanobacteria blooms, mesozooplankton grazed primarily on cyanobacteria, but also diatoms or cryptophytes. In contrast, microzooplankton did not have measurable grazing rates for any phytoplankton group during August and grazed only on green algae during September.

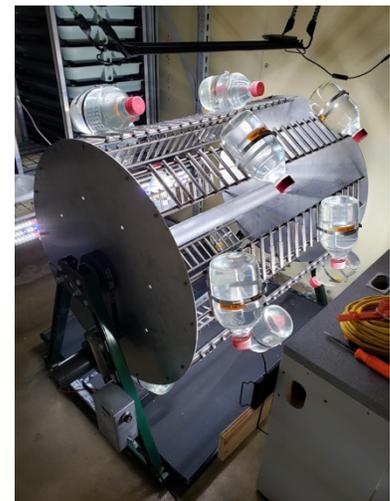


Figure 2. Plankton wheel incubating total zooplankton bottles (2.3 L) in an environmental chamber set at ambient western basin Lake Erie water temperature

Researcher Profile: Dr. Hood is an aquatic ecosystem ecologist and Assistant Professor in the Department of Evolution, Ecology, and Organismal Biology at Ohio State University. As an ecologist, he seeks to both improve general understanding of aquatic ecosystems and to determine how material and energy pathways are influenced by human induced changes.